
REPORT ON

Limited FCC CFR 47: Parts 15 and 24
and Industry Canada RSS-133 Testing
of an Intermec 700C Mobile Computer

COMMERCIAL-IN-CONFIDENCE

FCC ID: EHAMC75 and IC ID: 1223A-MC75

Report No OR615078/03 Issue 1

April 2006



Product Service

Competence. Certainty. Quality

COMMERCIAL-IN-CONFIDENCE

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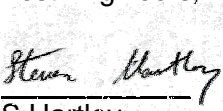
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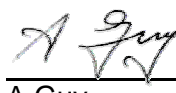
20th April 2006

ENGINEERING STATEMENT

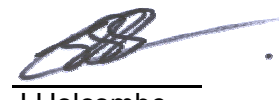
The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Parts 15 and 24. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;


S Hartley


A Guy




J Holcombe


P Harrison

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SECTION 1

REPORT SUMMARY

Limited FCC CFR 47: Parts 15 and 24
and Industry Canada RSS-133 Testing
of an Intermec 700C Mobile Computer



Product Service

1.1 STATUS

Equipment Under Test	700C Mobile Computer
Objective	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
Name and Address of Client	Intermec Technologies Corporation 550 Second Street S.E. Cedar Rapids Iowa 52401 USA
Type	700C
Part Number	700C
Serial Number	1890600173
Declared Variants	None
Test Specification/Issue/Date	FCC CFR 47: Part 15, Subparts B and C: 2003 FCC CFR 47: Part 24, Subpart D: 2004 RSS-133: Issue 3: 2005
Number of Items Tested	One
Security Classification of EUT	Commercial-in-Confidence
Incoming Release Date	Declaration of Build Status 20 th February 2006
Disposal Reference Number Date	Held pending disposal Not Applicable Not Applicable
Order Number Date	7500003132 3 rd February 2006
Start of Test Finish of Test	10 th March 2006 24 th March 2006
Related Documents	ANSI C63.4: 2001 RSS-212, Issue 1: 1999 SRSP-510, Issue 3: 2003



1.2 INTRODUCTION

The information contained within this report is intended to show limited verification of compliance of the Intermec 700C Mobile Computer to the requirements of FCC Specification Parts 15 and 24 and Industry Canada Radio Specifications RSS-133.

Testing has been performed under the following site accreditations

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory


Industry Canada Accreditation
IC4270 Octagon House, Fareham Test Laboratory

1.2 INTRODUCTION

1.2.1 Declaration of Build Status

MAIN EUT	
MANUFACTURING DESCRIPTION	Mobile Computer
MANUFACTURER	Intermec Technologies Corporation
TYPE	700C
PART NUMBER	700C
SERIAL NUMBER	TBD
HARDWARE VERSION	200
SOFTWARE VERSION	14053
TRANSMITTER OPERATING RANGE	Quad band GSM, 802.11b/g, Bluetooth radios
RECEIVER OPERATING RANGE	Quad band GSM, 802.11b/g, Bluetooth radios
COUNTRY OF ORIGIN	Singapore
INTERMEDIATE FREQUENCIES	
ITU DESIGNATION OF EMISSION	GXW or G7W, 26M0G1D, 1M00Q1D
HIGHEST INTERNALLY GENERATED FREQUENCY	400 MHz for processor
OUTPUT POWER (W or dBm)	2W/1W, 100 mW, 11 mW
FCC ID	EHAMC75
INDUSTRY CANADA ID	1223A-MC75
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	700C mobile computer used for inventory control applications.
BATTERY/POWER SUPPLY	
MANUFACTURING DESCRIPTION	Lithium Ion Battery Pack
MANUFACTURER	Intermec Technologies
VOLTAGE	+7.2V

Signature



Date

20th February 2006

D of B S Serial No

0001

TUV Product Service Limited formally certifies that the manufacturer's declaration as reproduced in this report is a true and accurate record of the original received from the applicant.

1.3 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out is shown below.

FCC CFR 47: Part 15, Subpart B and RSS-133

Test	Spec Clause		Test Description	Result	Comments
	FCC	Industry Canada			
2.1	Part 15.109	RSS-132, 6.6 RSS-133, 6.7 RSS-Gen, 6	Spurious Radiated Emissions	Pass	
2.2	Part 15.107	RSS-Gen, 7.2.2	Conducted Emissions	Pass	

FCC CFR 47: Part 24, Subpart E and RSS-133

Test	Spec Clause		Test Description	Result	Comments
	FCC	Industry Canada			
2.3	Part 22.1046 Part 24.232 (b)	RSS-133, 6.4	Maximum Peak Output Power - Radiated	Pass	
	Part 2.1046 Part 24.232	RSS-133, 6.4	Maximum Peak Output Power - Conducted		
	Part 2.1047(d)	RSS-133, 6.2	Modulation Characteristics		
	Part 2.1049, Part 24.238 (b)	RSS-133, 6.5	Occupied Bandwidth		
	Part 2.1051, Part 24.229 Part 24.238	RSS-133, 6.5	Spurious Emissions at Antenna Terminals (+/- 1MHz)		
2.4	Part 22.1053, Part 24.238	RSS-133, 6.3	Radiated Spurious Emissions	Pass	
	Part 2.1051, Part 24.238 (a)	RSS-133, 6.5	Conducted Spurious Emissions		
	Part 2.1055, Part 24.235	RSS-133, 6.3	Frequency Stability Under Temperature Variations		
	Part 2.1055, Part 24.235	RSS-133, 6.3	Frequency Stability Under Voltage Variations		

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was an Intermec 700C Mobile Computer used for inventory control applications.

1.4.2 Modes of Operation

Modes of operation of the EUT during testing were as given in section 1.4.3:

FCC Part 24 testing was carried out with the EUT transmitting at maximum power or receiving as detailed in section 1.4.3.

FCC Part 15 B testing was carried out with the EUT in Idle mode.

Maximum Output Powers and Classes were;

GSM (Class 1) DCS 1800 / PCS 1900 = 29.3dBm
GPRS (Class 10) Class B operation
DCS 1800/PCS 1900 = 25.0dBm

1.4.3 Test Configuration

Test Configuration – GPRS 1900 Mode

1900MHz transmitting on the following channels and frequencies;
Bottom Channel 512: 1850.2MHz
Middle Channel 661: 1880.0MHz
Top Channel 810: 1909.8MHz
1900MHz receiving on the following channels and frequencies;
Middle Channel 661: 1880.0MHz

Test Configuration – EDGE 1900 Mode

1900MHz transmitting on the following channels and frequencies;
Bottom Channel 512: 1850.2MHz
Middle Channel 661: 1880.0MHz
Top Channel 810: 1909.8MHz
1900MHz receiving on the following channels and frequencies;
Middle Channel 661: 1880.0MHz



Product Service

1.5 TEST CONDITIONS

The EUT was set-up simulating a typical user installation at the Test Laboratory, as listed in Section 1.2 and tested in accordance with the applicable specification.

The Intermec 700C Mobile Computer was powered by a 7.2V Lithium Ion Battery Pack for FCC Part 24 testing.

The Intermec 700C Mobile Computer was powered by 120V 60Hz for FCC Part 15 B testing in Idle Mode only.

1.6 DEVIATIONS FROM THE STANDARD

Not Applicable

1.7 MODIFICATION RECORD

Not Applicable

1.8 ALTERNATIVE TEST SITE

Not Applicable

SECTION 2

TEST RESULTS

Limited FCC CFR 47: Parts 15 and 24
and Industry Canada RSS-133 Testing
of an Intermec 700C Mobile Computer

2.1 SPURIOUS RADIATED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47: Part 15 Subpart B, Section 15.109, Industry Canada RSS-133, 9

2.1.2 Equipment Under Test

700C Mobile Computer

2.1.3 Date of Test

21st March 2006

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

Test Performed in accordance with ANSI C63.4 and RSS-212.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

Emissions identified within the range 1GHz – 20GHz were then formally measured using Peak and Average Detectors, as appropriate.

The measurements were performed at a 3m distance unless otherwise stated.

2.1 SPURIOUS RADIATED EMISSIONS

2.1.6 Test Results

Equipment Designation: Unintentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.109 and Industry Canada RSS-133, 9 for Spurious Radiated Emissions (30MHz – 1GHz).

Measurements were made with the EUT in GPRS 1900 Idle Mode.

EUT Receiving on Middle Channel (1880.0MHz)

The levels of the six highest emissions measured in accordance with the specification are presented below: -

Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz		cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
37.39	Vertical	100	0	23.8	15.47	40.0	100.0
40.32	Vertical	100	0	23.0	14.11	43.5	150.0
41.77	Vertical	100	0	21.3	11.66	46.0	200.0
51.64	Vertical	100	0	19.6	9.58	46.0	200.0
56.56	Vertical	100	0	16.5	6.68	46.0	200.0
63.56	Vertical	100	0	16.3	6.55	46.0	200.0

No other emissions were detected above the noise floor of the measuring system which was at least 15dB below the specification limit.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.109 and Industry Canada and RSS-133, 9 for Spurious Radiated Emissions (1GHz - 20GHz).

No emissions were found above 1GHz.

2.2 CONDUCTED EMISSIONS

2.2.1 Specification Reference

FCC CFR 47: Part 15 Subpart B, Section 15.107, Industry Canada RSS-Gen, 7.2.2

2.2.2 Equipment Under Test

700C Mobile Computer

2.2.3 Date of Test

24th March 2006

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

All Conducted Emission measurements were made within a Screened Enclosure, on the Live and Neutral Lines.

The disturbances were formally measured using both Quasi-Peak and Average Detectors which met the CISPR requirements.

2.2.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.107 and Industry Canada RSS-Gen 7.2.2 for Conducted Emissions (150kHz – 30MHz).

Measurements were made with the EUT in GPRS 1900 Idle Mode.

EUT Receiving on Middle Channel (1880.0MHz)

The levels of the six highest emissions measured in accordance with the specification are presented in the tables that follow.

2.2 CONDUCTED EMISSIONS

2.2.6 Test Results

Frequency	Quasi-Peak Level	Quasi-Peak Specification Limit	Average Level	Average Specification Limit	Result
MHz	dBμV	dBμV	dBμV	dBμV	
0.150	57.7	66.0	44.6	56.0	Pass
0.222	48.1	62.7	39.4	52.7	Pass
0.298	42.0	60.3	35.5	50.3	Pass
0.375	41.6	58.4	37.0	48.4	Pass
0.447	38.9	56.9	34.5	46.9	Pass
23.487	40.9	60.0	34.2	50.0	Pass

Live Line Test Results

The margin between the specification requirements and all other emissions was 21.5dB or more below the specified Quasi-Peak and 18.1dB or more below the specified Average limit.

Frequency	Quasi-Peak Level	Quasi-Peak Specification Limit	Average Level	Average Specification Limit	Result
MHz	dBμV	dBμV	dBμV	dBμV	
0.150	57.4	66.0	45.6	56.0	Pass
0.298	43.1	60.3	36.9	50.3	Pass
0.375	42.8	58.4	38.1	48.4	Pass
0.447	39.0	56.9	36.0	46.9	Pass
2.985	36.8	56.0	28.8	46.0	Pass
23.865	37.6	60.0	31.8	50.0	Pass

Neutral Line Test Results

The margin between the specification requirements and all other emissions was 22.4dB or more below the specified Quasi-Peak and 18.2dB or more below the specified Average limit.

2.3 MAXIMUM PEAK OUTPUT POWER (RADIATED)

2.3.1 Specification Reference

FCC CFR 47: Part 24 Section 24.232(b) and Industry Canada RSS-133, 6.2

2.3.2 Equipment Under Test

700C Mobile Computer

2.3.3 Date of Test

16th March 2006

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

A peak measurement of the carrier frequency was recorded with the EUT in its worse case orientation using a RES B/W of 1MHz and Vid B/W of 1MHz at a distance of 3m.

A signal generator was then connected to horn antenna at 1.5m fixed height, at the 3m position in place of the EUT. The measuring receive horn and the substituting transmit horn were then electronically aligned (height search at the received frequency until maximum correlation is achieved).

The signal generator level was adjusted until the recorded peak level (raw peak) was reproduced. The cable was then removed from the substitution transmit horn and attached to the measurement receiver input. The measured level into the substitution transmit horn and its isotropic gain was used to calculate the maximum radiated peak output power (EIRP).

2.3 MAXIMUM PEAK OUTPUT POWER (RADIATED)

2.3.6 Test Results

Maximum Power - GPRS

Frequency MHz	Output Power dBm	Isotropic Gain dB	Result dBm	Result mW
1850.0	18.2	8.6	26.8	478.6
1880.0	19.5	8.6	28.1	645.7
1910.0	18.4	8.7	27.1	512.9

Maximum Power - EGPRS

Frequency MHz	Output Power dBm	Isotropic Gain dB	Result dBm	Result mW
1850.0	18.2	8.6	26.8	478.6
1880.0	19.4	8.6	28.0	630.9
1910.0	17.7	8.7	26.4	436.5

Limit	<2W or <+33.0dBm
-------	------------------

Remarks

EUT complies with FCC CFR 47: Part 24 Section 24.232(b) and Industry Canada RSS-133, 6.4. The EUT does not exceed 2W or +33dBm at the measured frequencies.

2.4 RADIATED SPURIOUS EMISSIONS

2.4.1 Specification Reference

FCC CFR 47: Part 24 Section 24.238 and Industry Canada RSS-133, 6.3

2.4.2 Equipment Under Test

700C Mobile Computer

2.4.3 Date of Test

19th March 2006

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, the list of emissions was then confirmed or updated under Anechoic Chamber alternative open area test site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

Emissions identified within the range 1GHz – 20GHz were then formally measured using Peak and Average Detectors, as appropriate.

The measurements were performed at a 3m distance unless otherwise stated.

2.4 RADIATED SPURIOUS EMISSIONS

2.4.6 Test Results - continued

30MHz – 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 and Industry Canada RSS-133, 6.3 for Radiated Emissions (30MHz – 1GHz).

No emissions were found from 30MHz to 1GHz for GPRS 1900 Mode and EDGE 1900 Mode on channels 512, 661 or 810.

1GHz – 20GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 and Industry Canada RSS-133, 6.3 for Radiated Emissions (1GHz - 20GHz).

Measurements were made with the EUT in GPRS 1900 Mode

EUT Transmitting on Bottom Channel (1850.0MHz)

Frequency MHz	Antenna Polarisation	Height cm	Azimuth Degree	Peak Result dBm	Peak Limit dBm
3700.0	Horizontal	129	104	-31.7	-13.0
5551.0	Horizontal	115	237	-36.0	-13.0
7401.0	Horizontal	100	225	-27.4	-13.0

EUT Transmitting on Middle Channel (1880.0MHz)

Frequency MHz	Antenna Polarisation	Height cm	Azimuth Degree	Peak Result dBm	Peak Limit dBm
3760	Horizontal	106	184	-29.5	-13.0
5640	Horizontal	100	235	-37.1	-13.0
7520	Horizontal	100	119	-35.5	-13.0

EUT Transmitting on Top Channel (1910.0MHz)

Frequency MHz	Antenna Polarisation	Height cm	Azimuth Degree	Peak Result dBm	Peak Limit dBm
3820.0	Horizontal	105	177	-28.1	-13.0
5729.0	Horizontal	100	233	-40.9	-13.0
7639.0	Horizontal	100	120	-37.2	-13.0

2.4 RADIATED SPURIOUS EMISSIONS

2.4.6 Test Results - continued

1GHz – 20GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 and Industry Canada RSS-133, 6.3 for Radiated Emissions (1GHz - 20GHz).

Measurements were made with the EUT in EDGE 1900 Mode

EUT Transmitting on Bottom Channel (1850.0MHz)

Frequency MHz	Antenna Polarisation	Height cm	Azimuth Degree	Peak Result dBm	Peak Limit dBm
3700.0	Horizontal	105	80	-33.1	-13.0
5550.0	Horizontal	100	184	-35.8	-13.0
7401.0	Horizontal	100	235	-30.0	-13.0

EUT Transmitting on Middle Channel (1880.0MHz)

Frequency MHz	Antenna Polarisation	Height cm	Azimuth Degree	Peak Result dBm	Peak Limit dBm
3760.0	Horizontal	120	162	-28.5	-13.0
5640.0	Horizontal	120	175	-28.5	-13.0
7520.0	Horizontal	118	130	-29.1	-13.0

EUT Transmitting on Top Channel (1910.0MHz)

Frequency MHz	Antenna Polarisation	Height cm	Azimuth Degree	Peak Result dBm	Peak Limit dBm
3820.0	Horizontal	105	157	-23.8	-13.0
5729.0	Horizontal	153	173	-38.0	-13.0
7639.0	Horizontal	105	194	-38.0	-13.0



Product Service

SECTION 3

TEST EQUIPMENT

3.1 TEST EQUIPMENT

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.1 and 2.4 EMC - Radiated Emissions				
Spectrum Analyser	Hewlett Packard	8542E	18	09/02/2007
Radiocommunications Tester	Rohde & Schwarz	CMU 200	39	07/07/2006
Signal Generator	Rohde & Schwarz	SWM 02	62	O/P MON
Amplifier	Miteq Corp	AMF-3d-001080-18-13P	231	O/P MON
DRG Antenna	EMCO	3115	234	01/07/2006
DRG Antenna	EMCO	3115	235	01/07/2006
Filter (High Pass, 3GHz)	RLC Electronics	E100-300-5-R	565	O/P MON
Signal Generator	Rohde & Schwarz	SMY01	1330	01/04/2006
EMI Test Receiver	Rohde & Schwarz	ESI26	1505	O/P MON
Bilog Antenna	Chase	CBL6111B	1508	16/04/2006
DRG Antenna	EMCO	3115	1509	O/P MON
DRG Antenna	EMCO	3115	1510	O/P MON
PRE AMPLIFIER	Phase One	PS04-0085	1532	13/07/2006
PRE-AMPLIFIER	Phase One	PS04-0086	1533	13/07/2006
PRE AMPLIFIER	Phase One	PS04-0087	1534	12/07/2006
Tuneable Notch filter	K&L 5wave	3TNF-500/1000	1535	O/P MON
Screened Room (5)	Rainford	Rainford	1545	01/03/2008
Mast Controller	Inn-Co GmbH	CO 1000	1606	O/P MON
Turntable/Mast Controller	EMCO	2090	1607	O/P MON
3m N-N RF Cable	Rosenberger	3899	1871	11/04/2006
15m N-N RF Cable	Rosenberger	FA210A-150M	2026	11/04/2006
EMI Test Receiver	Rohde & Schwarz	ESIB26	2028	06/05/2006
3GHz HPF	Sematron	E100-3000-5-R	2244	O/P MON
Amplifier (8GHz-18GHz)	Avantec	AWT-18036	2821	O/P MON
FILTER HI PASS 71500	RLC Electronics	RLC-F100-1500-S	2843	16/05/2006
Bilog Antenna	Chase	CBL6143	2904	10/11/2007

3.1 TEST EQUIPMENT

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.2 EMC - Conducted Emissions				
Transient Limiter	Hewlett Packard	11947A	15	22/09/2006
LISN	Rohde & Schwarz	ESH2-Z5	17	22/02/2007
Test Receiver	Rohde & Schwarz	ESIB26	2085	26/09/2006
Section 2.3 EMC - Maximum Output Power				
Signal Generator	Rohde & Schwarz	SWM 02	62	O/P MON
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	01/07/2006
Antenna (Dipole, 300MHz-1000MHz)	Schwarzbeck	UHAP	447	08/09/2007
Attenuator (10dB, 10W)	Marconi	6534/3	1048	O/P MON
Mast Controller	Inn-Co GmbH	CO 1000	1606	O/P MON
Turntable/Mast Controller	EMCO	2090	1607	O/P MON
Bilog Antenna	Chase	CBL6143	2904	10/11/2007
Dipole Holder	Index Sar	n/a	2989	O/P MON



3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Conducted Emissions, LISN	150kHz to 30MHz Amplitude	3.2dB*

Worst case error for both Time and Frequency measurement 12 parts in 10^6 .

* In accordance with CISPR 16-4

† In accordance with UKAS Lab 34



Product Service

SECTION 4

PHOTOGRAPHS

4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)



Radiated Emissions Test Setup



Conducted Emissions Setup



Product Service

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

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